

CLAIMS

1. An X-ray topographic system comprising:  
an X-ray generator for producing a beam of  
X-rays directed towards a sample location; and  
a detector positioned to receive X-rays  
deflected by a sample at the sample location, the  
detector comprising an electronic X-ray detector  
having an array of pixels corresponding to the beam  
area at the detector.
2. A system according to claim 1, in which the  
beam has a divergence of up to 20 milliradians.
3. A system according to claim 1, including an X-  
ray optic interposed between the X-ray generator and  
the sample location, and arranged to receive said  
beam and to transmit the X-rays as a substantially  
parallel beam.
4. A system according to claim 1, in which the  
detector is positioned to receive deflected X-rays  
transmitted through the sample.
5. A system according to claim 1, in which the  
detector is positioned to receive deflected X-rays  
reflected from the sample.
6. A system according to claim 1, in which the X-  
ray generator is adapted to produce a source spot  
size of 100  $\mu\text{m}$  or less and has an exit window less  
than 20 mm from the target.

- 1    7.    A system according to claim 6, in which the  
2    system resolution is about 25  $\mu\text{m}$  and the detector is  
3    located 5 - 10 mm from the sample location.  
4
- 5    8.    A system according to claim 3, in which the X-  
6    ray optic is a lobster eye optic comprising a number  
7    of parallel, X-ray reflective plates.  
8
- 9    9.    A system according to claim 8, in which the  
10   plates are about 150  $\mu\text{m}$  thick and are coated with  
11   gold.  
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- 13   10.   A system according to claim 1, in which the  
14   detector is a charge coupled device.  
15
- 16   11.   An X-ray topographic apparatus comprising an X-  
17   ray topographic system according to claim 1,  
18   stepping means for producing relative stepwise  
19   motion between the system and a sample to be  
20   inspected, the step size being a function of the  
21   beam area, and image processing means for reading  
22   out the pixel data of the detector between  
23   successive steps.  
24
- 25   12.   Apparatus according to claim 11, in which the  
26   stepping means comprises an XY table movable with  
27   respect to the X-ray generator and the detector, and  
28   a pair of servomotors arranged to step the XY table  
29   in orthogonal directions.  
30
- 31   13.   Apparatus according to claim 11, in which the  
32   stepping means comprises a boule transport device

1 arranged to rotate and axially translate a boule  
2 with respect to the X-ray generator and the  
3 detector, and a pair of servomotors arranged to step  
4 the boule transport device in rotation and  
5 translation.

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7 14. Apparatus according to claim 11, in which the  
8 image processing means comprises means for storing  
9 the pixel data output from each step, and means for  
10 combining data from successive steps to form a  
11 composite image.

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13 15. Apparatus according to claim 11, in which the  
14 detector operates in raster scan, and the image for  
15 each step is derived by integrating a plurality of  
16 scanning frames.

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18 16. Apparatus according to claim 11, in which the  
19 X-ray beam has sufficient divergence to produce  
20 doubling of the image at the detector, and in which  
21 the image processing means is operative to remove  
22 the effects of said image doubling.